

## STABILIZED MOLDING COMPOUNDS COMPRISED OF BIOLOGICALLY DEGRADABLE MATERIALS

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**Cited documents:**

 EP0271914 (A2)  
 EP0850985 (A1)  
 EP0890604 (A1)  
 EP0527371 (A2)  
 EP0460481 (A2)

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### Abstract of **WO 9929768 (A1)**

The invention relates to stabilized thermoplastic molding compounds comprised of biologically degradable polymers which are stabilized against hydrolytic and microbial degradation and a method for producing concentrates based on thermoplastic biologically degradable polymers. The invention also relates to a method for producing hydrolysis stabilized and antimicrobial or microbistatic acting thermoplastic biologically degradable molding compounds as well as to the utilization of the inventive stabilized molding compounds as biologically degradable materials for the production of semi-finished goods, films, injection molded parts, monofilaments, multifilaments, fibers, non-wovens and wovens. In addition, the invention relates to the molded bodies produced from the molded compounds such as semi-finished goods, films, injection molded parts, monofilaments, multifilaments, fibers, non-wovens and wovens.

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Stabilized moulding compositions biological degradable materials subject-matter of the instant invention are against hydrolytic and microbial degradation stabilized thermoplastic moulding compositions from biological degradable polymers, a method to the preparation of concentrates on basis of thermoplastic biological degradable polymers, a method to the preparation hydrolysis-stabilized and antimicrobial or mikrobistatisch acting thermoplastic, biological degradable moulding compositions as well as the use stabilized of the according to invention moulding compositions as biological degradable materials for the preparation of semi-finished material, films, injection mold parts, Mono-und multifilaments, fibers, fleeces and fabrics as well as the mouldings prepared from it and/or. Semi-finished material, films, injection mold parts, Mono-und of multifilaments, fibers, fleeces and fabrics themselves.

Biological degradable plastics are known (see for example EP-A 561224, EP-A 641,817). Hydrolysis stabilizers and microbicidal ones as well as mikrobistatische active agents are likewise known (see beisielsweise 9. , corrected and improved edition of the Römpp chemistry of lexicon on CD-ROM, version 1.0, Thieme publishing house of references " stabilisers ", "microbicidal ones", "Preventol", "carbodiimide").

Many biological degradable materials are generally an hydrolytic reducing mechanism accessible, that not only in presence of in the bottom, water and compost living microorganisms, but also with slower to moderate rate in presence of moisture already during the storage of the Granulates and during the use of the products prepared from it runs off.

The object of the instant invention consists of it, this premature degradation and Loss at material properties Ztl steer and to slow down in particular, without impairing thereby the desired biodegradation of the finished units after use in nen nenswertem scope.

Object is further an increase of the storage stability and extension of the Ge custom ability, in particular bottom humid climate conditions, according to invention the semi-finished material and finished units prepared from the moulding compositions. It was now found that by the addition from additives and stabilisers to biological degradable polymers of the onsets of the biological and hydrolytic degradation in such a manner delayed that also applications of long-terms, z becomes. B. in the building range or in the landscape gardening with these materials possible are.

Subject-matter of the invention are thermoplastic, biological degradable moulding compositions, contained biological degradable polymers and at least a stabiliser ausge selects from the group A1) and a2) aluminium) 0 to 50 Gew. - %, preferred 0.001 to 30 Gew. - % and particularly preferred

0,05 to 5 Gew. - %, related to total mixture, stabilisers selected from at least one from the group of the hydrolysis stabilizers, like z. B. aliphatic or aromatic monomers, oligomere or polymere Carbodi of imides, as for example carbodiimides, N, N' dicyclohexyls carbodiimid, urethanisierte N-Glycidyl-phthalimid, 1, 3-Bis (1-methyl-1-isocyanato-ethyl) - benzene with terminal Isocyanat-Harnstoff-und/or urethane groups, to (trimethylsilyl) carbodiimid, polyfunctional oxazolines, polyfunctional Epoxide, polyfunctional isocyanates, preferably selected from that

Group of the polymere or polymere-bonded carbodiimides, which are spielsweise available with from the coals dioxide splitting off taking place polymerization bottom by conventional catalysts more aromatic or more aliphatic

Isocyanates as for example 2,6-Diisopropylphenylisocyanat, 1, 3, 5-Triiso propyl-2,4-diisocyanatobenzol, Naphthalin-1,5-diisocyanat, 2,4-Diisocya nato-3,5-diethyltoluol, 4,4 ' - Methylen-bis (2,6-diethylphenylisocyanat), 4,4 ' - Methylen-bis (2-ethyl-6-methylphenylisocyanat), 4,4 ' - Methylen-bis (2-iso propyl-6-methylphenylisocyanat), 4,4 ' - Methylen-bis (2,6-diisopropylphenyl isocyanate), 4,4 ' - Methylen-bis (2-ethyl-6-methylcyclohexylisocyanat) and a2) 0 to 50 Gew. - %, preferred 0.001 to 30 Gew. - % and particularly preferred

0,01 to 5 Gew. - spielsweise Thiurame, Thiophthalimide, Sulfamide, urea derivatives, Tria of zol derivatives, Triazolin derivatives, Benzimidazol derivatives, Benzimidazolyl of carbaminsäure derivatives, aryl sulfones, Sulphenylsulfamide, phenols selects %, related to total mixture, a stabiliser, ausge and from at least one from the group of the microbe protective agents, with Phenolate, Thiobenzothiazol derivatives, Aminoalkohole, Isothiazolinone, Benzothiazoles, pyrethroids and B) 0 to 85 Gew. - %, related to total mixture, fill and reinforcement materials, preferably natural inorganic, synthetic inorganic or nature left che organic on the basis regenerating raw materials or synthetic or ganische, metallic or a mixture from several these ingredients.

Particularly preferred is food-contact-allowed carbodiimides and/or. a mixture from it.

Furthermore subject-matter of the invention are additive concentrates on basis biological degradable polymers themselves. Prior concentrates, which are based for example on polyethylene or polyesters, are not sufficient for the requirement after complete biodegradation. Furthermore are the melting ranges of conventional, for example concentrates, and biological degradable, usually aliphatic or only part-aromatic, based on aromatic polyesters, plastics very more bottom schiedlich, so that an homogeneous incorporation of the conventional known concentrates is made more difficult into biological degradable polymers. The concentrates on basis of the biological degradable plastics keit the advantage of the good material compatible and the homogeneous distribution of the additives connected thereby in jeweili towards matrix. The concentrates contain generally up to 40 Gew. - %, preferred 1 to 30 Gew. - %, in particular 5 to 20 Gew. - % stabiliser related to the total mixture.

As biological degradable polymers are for example suitable aliphatic polyester or copolyester, aromatic polyester or copolyester, aromaticalpha tables copolyesters, polycarbonates, polyester carbonates, aliphatic or part-aromatic polyester urethanes, polyesteramides, Polyetheramide, Polyetheresteramide, cellulose ethers, Celluloseetherester, thermoplastic starch, starch derivatives or copolymers or a mixture from these components.

The subsequent polymers are preferably suitable: Aliphatic or part-aromatic polyesters from A) aliphatic bifunctional alcohols, preferred linear C-to Cjo The alcohols as for example ethanediols, butanediols, hexanediols or particularly preferred butanediols and/or if necessary

⌘ to cyclo-aliphatic bifunktion inches alcohols, preferred with 5 or 6 C-atoms in the cyclo-aliphatic

Ring, as for example cyclohexanedimethanol, and! or partial or complete instead of the diols monomers or oligomere polyols on basis Eth

ylenglykol, propylene glycol, tetrahydrofuran or copolymers from it also

Molecular weights to 8000, preferred to 4000, and/or if necessary small amounts branched bifunctional alcohols, preferred C3-C12-Alkyldiol, as for example Neopentylglykol, and additional if necessary small amounts high-functional alcohols such as for example 1,2, 3-Propantriol or trimethylolpropane as well as from aliphatic bifunctional acidic ones, preferably C2-Cl-Alkyldicarbonsäuren, 1E with spielsweise and preferred succinic acid, adipic acid and/or giving if aromatic bifunctional acidic ones as for example terephthalic acid, isophthalic acid, naphthalenedicarboxylic acid and additional if necessary small amounts high-functional acidic one as for example trimellitic acid or B) säure- und alcohol-funktionalisierte Vorrichtungen, preferably with 2 to 12

C-atoms in the alkyl chain for example Hydroxybuttersäure, Hydroxyvaleriansäure, lactic acid, or their derivatives, for example s-Caprolactone or Dilactid, or a mixture and/or a copolymer from A and

B, whereby the aromatic acids no more than 50 Gew. - % portion, related to all acidic ones, constitute; Aliphatic or part-aromatic polyester urethanes from C) aliphatic bifunctional alcohols, preferred linear C) - to C10 The alcohols as for example ethanediol, butanediol, hexanediol, particularly butanediol preferred and/or if necessary cyclo-aliphatic bifunctional alcohols, preferably with C5 or C6-cycloaliphatic ring, as for example cyclohexanedimethanol, and/or partial or complete instead of the diols monomers or oligomere polyols on basis ethylene glycol,

Propylene glycol, tetrahydrofuran or copolymers from it with molecular weights to 4000, preferred to 1000, and/or if necessary small amounts branched bifunctional alcohols, preferably C3-C12

Alkyldiol, as for example Neopentylglykol, and additional giving if small amounts high-functional alcohols, preferably C3-C12

Alkylpolyol, as for example 1,2, 3-Propantriol or trimethylolpropane as well as from aliphatic bifunctional acidic ones, preferably CFC alkyl dicarbonic acids, as for example and preferred amber acid, adipic acid and/or if necessary aromatic bifunctional

Acidic as for example Naphthalindiisophthalic acid, carbonic acid and additional if necessary small amounts high functional acidic one as for example trimellitic acid or D) säure- und alcohol-funktionalisierte Vorrichtungen, preferably with 2 to 12

C-atoms, for example hydroxybutyric acid, Hydroxyvaleriansäure, lactic acid, or their derivatives, for example s-caprolactone or Dilactid, or a mixture and/or a copolymer from C and D, whereby the aromatic acids no more than 50 Gew. - % portion, related to all acidic ones, constitute; E) the reaction product of C and/or D with aliphatic and/or cycloaliphatic bifunctional and additional if necessary high-functional isocyanates, with preferably 1 to 12 C-atoms and/or 5 to 8 C-atoms in

Cases of cyclo-aliphatic isocyanates, z. B. Tetramethyldiisocyanat, Hexamethylene diisocyanat, isophorone diisocyanat, if necessary additional with linear and/or branched and/or cyclo-aliphatic bifunctional alcohols, advantages are C3-Cl-Alkyldiol or polyol and/or, z. B. get 5 to 8 C-atoms in case of cyclo-aliphatic Alko. B. Ethanediol, hexanediol, butanediol, cyclohexanedimethanol, and/or if necessary additional with linear and/or branched and/or cyclo-aliphatic bifunctional and/or high-functional

Amines and/or Aminoalkohole with preferably 2 to 12 C-atoms in the alkyl chain, z. B. Ethyl diamine or aminoethanol and/or giving if other modified amines or alcohols as for example ethyl diaminoethansulfonsäure, as free acid or as salt, whereby the ester portion of C) and/or D) at least 75 Gew. - %, related to those

Sum from C), D) and E), amounts to.

Aliphatic or aliphatic-aromatic polyester carbonates out F) aliphatic bifunctional alcohols, preferred linear C2 to C10 The alcohols as for example ethanediols, butanediols, hexanediols or particularly preferred butanediols and/or if necessary cyclo-aliphatic bifunctional alcohols, preferably with 5 to 8 C-atoms in the cyclo-aliphatic

Ring, as for example cyclohexanedimethanol, and/or partial or complete instead of the diols monomers or oligomere polyols on basis Ethylene glycol, propylene glycol, tetrahydrofuran or copolymers from it also

Molecular weights to 4000, preferred until 1000, and/or if necessary small amounts branched bifunctional alcohols, preferably with C-C alkyl dicarbonic acids, as for example Neopentylglykol and too sätzlich if necessary small amounts high-functional alcohols as for example 1,2, 3-Propantriol, trimethylolpropane as well as from aliphatic bifunctional acidic ones as for example and preferred succinic acid, Adipic acid and/or if necessary aromatic bifunctional acidic ones as for example Naphthalindicarbonsäureisophthalsäure, and additional if necessary small amounts high-functional acidic ones as for example trimellitic acid or G) säure- und alcohol-funktionalisierte Vorrichtungen, preferably with 2 to 12

C-atoms in the alkyl chain, for example hydroxybutyric acid, hydroxyvaleriansäure, lactic acid, or their derivatives, for example s-caprolactone or Dilactid, or a mixture and/or a copolymer from F) and G), whereby the aromatic acids no more than 50 Gew. - % portion, related to all acidic ones, constitute,

H) a carbonate portion, which from aromatic bifunctional phenols, before bisphenol A, and carbonate donors, for example phosgene, become prepared or a carbonate portion, which becomes from aliphatic carbonate esters or their derivatives as for example chlorine carbonic acid esters or aliphatic carbonic acids or their derivatives as for example salts and Carbonatendern, for example phosgene, prepared, whereby the ester portion of F) and/or G) at least 70 Gew. - %, related to those

Sum from F), G) and H) amounts to.

Aliphatic or part-aromatic polyesteramides and/or. Polyetheresteramide from I) aliphatic bifunctional alcohols, preferred linear C-to C10 The alcohols as for example ethanediol, butanediol, hexanediol, particularly preferred butanediols, and/or if necessary cyclo-aliphatic bifunctional alcohols, preferably with 5 to 8 C-atoms, as for example Cyclohexandimethanol, and/or partial or complete polyols on basis ethylene glycol, oligomere monomers, instead of the diols monomers, propylene glycol,

Tetrahydrofuran of the copolymers from it with molecular weights to 10,000, preferred to 8000, in particular preferred to 5000, and/or giving if small amounts branched bifunctional alcohols, preferably

C3-C12-Alkyldiol, as for example Neopentylglykol and additional if necessary small amounts high-functional alcohols, preferably C3-C12-Alkylpolyol, as for example 1,2, 3-Propantriol, Trimethylolpropane as well as from aliphatic bifunctional acidic ones, preferably with 2 to 12 C-atoms in the alkyl chain, as for example and preferred Benzene-dicarboxylic acid, adipic acid and/or aromatic bifunctional if necessary acidic ones as for example terephthalic acid, isophthalic acid, naphthalenedicarboxylic acid and additional if necessary small amounts high functional acidic one as for example trimellitic acid or K) säure- und alcohol-funktionalisierte Vorrichtungen, preferably with 2 to 12

C-atoms in the carbon chain, for example hydroxybutyric acid, Hydroxyvaleriansäure, lactic acid, or their derivatives, for example s-caprolactone or Dilactid, or a mixture and/or a copolymer from I) and K), whereby the aromatic acids no more than 50 Gew. - % portion, related to all, constitute, L) an amide portion from aliphatic and/or cyclo-aliphatic bifunctional and/or if necessary small amounts branched bifunctional amines, preferred are linear aliphatic C-to C10-Diamine, and additional if necessary small amounts high-functional amines, the bottom amines preferred hexamethylenediamine, isophorondiamine and preferred hexamethylenediamine, as well as from linear and/or cyclo-aliphatic bifunctional acidic ones, preferably with 2 to 12 C-atoms in the alkyl chain and/or C5- oder C6-Ring in case of cyclo-aliphatic, preferred adipic acid, and/or if necessary small amounts branched bifunctional and/or if necessary aromatic bifunctional acidic ones as for example terephthalic acid, isophthalic acid, Naphthalindicarbonsäure and additional if necessary small amounts high functional acidic ones, preferably with 2 to 10 C-atoms, or M) an amide portion from acid and amine-funktionalisierte Vorrichtungen, before zugswise with 4 to 20 C-atoms in the cyclo-aliphatic chain, preferred c) - Laurinlactam, e-caprolactams, particularly preferred e-caprolactams or a mixture from L) and M) as amide portion, whereby the ester portion of I) and/or K) at least 30 Gew. - %, related to the sum from I), K), L) and M) amounts to, preferably the weight of the ester structures 30 to 70 Gew. - %, the portion of the amide structures 70 to 30 Gew. - % amounts to %.

The Polyetheresteramide is in particular constructed from the subsequent Monomers: Oligomers of polyols existing from polyethylene glycols, polypropylene glycols, random or block-like constructed polyglycols from mixtures from ethylene oxide or propylene oxide, or

Polytetrahydrofurane with molecular weights (weight averages) between 100 and 10,000 and monomers of diols, preferably C2-Cl2-Alkyldiole, in particular C-C6-Alkyldiole, for example ethylene glycol, 1,4-Butandiol, 1, 3-Propandiol, 1,6-Hexandiol, and at least a monomer selected from the group of the dicarbonic acids, preferably C2-Cl, particularly preferred C-C6-Alkyldicarbonic acid, for example oxalic acid, pray-stone-acidic, adipic acid, also in form of their respective esters (methyl, ethyl etc.) C2-Cl2Alkyldihydroxycarbonsäuren and lactones such as caprolactone and. A.

Aminoalkohole with 2 to 12 carbon atoms in the alkyl chain, for example ethanolamine, Propanolamin of cyclic lactams with 5 to 12, preferred 6 to 11, C-atoms, like E-caprolactams or Laurinlactam etc. CO aminocarbonic acids with 6 to 12 C-atoms in the alkyl chain such as Aminocapron acidic etc.

Mixtures (1: 1 salts) from C2-Cl2-Alkyldicarbonsäuren, for example Adipin acidic, succinic acid and C2-Cl-Alkyldiaminen, for example hexamethylen diamine, diaminobutane.

Likewise both hydroxyl or acidic-terminated polyesters with molecule-bad wichten between 300 and 10,000 as ester-formed component used can become. The portion Ether and of the ester portions in the polymer amounts to generally 5 to 85 Gew. - %, related to the entire polymer.

The Polyetheresteramide according to invention has generally an average molecular weight (M, v determined after gel chromatography in the cresol against standard polystyrene) of 10,000 to 300,000, preferably from 15,000 to 150,000, in particular from 15,000 to 100,000.

All acidic ones can become also in the form of derivatives as for example acid chlorides or esters, both and monomers and and oligomere esters, used.

The synthesis of the biological degradable polyesteramides according to invention can both after the " PP method " by stoichiometric mixing of the starting components if necessary bottom addition of water and subsequent removing water from the reaction mixture and after the " polyesters method " by stoichiometric mixing of the starting components as well as addition of an excess at diol with esterification of the acid groups and following the transesterification and/or. Umamidierung of these esters take place. In this second case beside waters also the excess at diol is again abdestilliert. Preferred one is the synthesis after the described " polyester method ".

The polycondensation can become further by the use of known catalysts accelerated. Both the bekanten phosphorus compounds, those the PP synthesis accelerate and acidic or metal-organic catalysts ftir the esterification like also combinations from the two are to the Beschleunigung the polycondensation possible.

It is to be made certain that the catalysts neither the biological degradable and/or. Kompostierbarkeit still the quality of the resultant compost negative influences. Further the polycondensation knows to polyesteramides by idiom of lysine, Lysinderivaten or other amidisch branching out Produkt ten as for example Aminoethylaminoethanol affected to become, which accelerates and to branched products leads both the condensation (see for example to DE-A 38 31 709).

The preparation of polyesters, polyester carbonates and polyester urethanes is well known and/or. becomes after prior art methods analogous conducted (see. z. B.

EP-A 304,787, WHERE 95/12629, WHERE 93/13154, EP-A 682,054, EP-A 593,975).

The polyesters, polyester urethanes according to invention, polyester carbonates or polyesteramides can do further 0.1 to 5 Gew. - %, preferred 0.1 to 1 Gew. - % on two gladly contained (see. also description of the polymers). This Verzweiger können z. B. trifunktional alcohols such as trimethylolpropane or glycerol, tetraftmktio nelle alcohols such as pentaerythritol, trifunktional carbonic acids such as citric acid its. The Verzweiger increases the melt viscosity of the polyesteramides according to invention so far that extrusion blow moulding with these polymers becomes possible.

The biodegradation of these materials does not become hindered thereby.

The biological degradable/kompostierbaren polyester urethanes, polyester, polyester carbonates and polyesteramides have usually a molecular weight of at least 10,000 g/mol and to possess generally a random distribution of the output of materials in polymers. With PU-typical structure of polymer, if necessary from C) and D) as well as from E) is not to be expected a complete random distribution of the monomer components always.

A particularly preferred polycarbodiimide is the aromatic polycarbodiimide, that in zero position to the Carbodiimidgnippen, D. h. in 2,6 - or 2,4,6-Stellung at the benzene core with isopropyl groups substituted is. The contained polycarbodiimides have preferably an average molecular weight of 1500 to 15,000 to increase in particular resistance in such a manner that the final's group contents of the biological degradable plastics reduced and an hydrolytic stability of the biological degradable plastic achieved become.

The subsequent carbodiimides mentioned are exemplary:  
EMI13.1

EMI13.2

EMI13.3

whereby p is certain by the molecular weight.

The carbodiimides can become after actual prior art methods prepared (z. B.

DE-AS 25 37 685, DE-AS 11 56 401, DE-AS 24 19 968, FR 1,180,307).

Suitable according to invention Füll-und of reinforcement materials can be minerals, as for example kaolin, chalk, gypsum, mica, lime or talc or natural substances, as for example starch or modified starch, cellulose or cellulose derivatives or cellulose products, wood flour or natural fibers as for example hems, flax, sisal, Raps or Ramie. As metallic fillers further used iron powders, iron oxides, can become iron alloys (z. B. Ferrotitanium, Ferromolybdän, ferro-manganese), tungsten. Tungsten carbide, Ferrowolfram, molybdenum, manganese, cobalt, copper, zinc, tin or bismuth or combinations of it.

The biological degradable/complete kompostierbaren polyester urethanes according to invention, polyester, polyester carbonates lp of polyesteramides can become with conventional additives equipped. So modifiers and/or processing aids know as for example nucleating agent, softener, releasing from form aid, flame retardant, impact tough modifiers, stabilisers, example thermostability, oxidation stability, UV and light stability, farbgebendeweisezur agent (z. B. Pigments) or other additives used conventional within the thermoplastic range become, whereby it is to be made sure that the complete Kompostierbar becomes keit not impaired or is the remaining substances, for example inorganic aids, in the compost innocuous. The additives become generally in an amount up to 15 Gew. - %, related to the total mixture, course sets.

The moulding compositions according to invention are biological more degradable, preferably full continuous more degradable. Particularly preferred is such moulding compositions, which according to DIN 54,900 as complete degradable classified to become to be able.

The biological degradable/complete kompostierbaren polyester urethanes, polyester according to invention, polyester carbonates and

polyesteramides can also with other dazzling partners, z. B. thermoplastic starch, mixed becomes, whereby to it is to be paid attention that the complete Kompostierbarkeit does not become impaired or the remaining substances, for example inorganic aids, are in the compost innocuous.

For other operational areas, is not required with which biological degradable, used can become as other dazzling partners: Polyethylene, modified polyethylenes as for example maleic acid-anhydride-modified LDPE, a fluoro-thermoplastic as for example polytetrafluoroethylene, Tetrafluorethylen hexafluoropropylencopolymer, Tetrafluorethylen Perfluoralkoxy Vinylether copolymer, ethyl Tetrafluorethylen-copolymer, Polychlorotrifluor ethyls, ethyl chlorotrifluoroethyleneCopolymer, polyvinylidene fluoride, Polyvinylflu orid, Perfluoralkoxyalkan, Tetrafluorethylen hexafluoropropylenevinylidene fluoride copolymer, amorphous Perfluorpolymere, polyvinyl chloride, polyvinylidene chloride, a polypropylene, a polyvinyl alcohol, a polyvinyl acetate, a partial hydrolyzed polyvinyl acetates, a Polyvinylether, a polyether, a polyacrylate, an aliphatic polyester or a copolyester, an aromatic polyester or copolyester, an aromatic-aliphatic copolyester, a polycarbonate, a polyester carbonate, an part-aromatic polyurethane, an aliphatic polyurethane, a polyester urethane, a polyamide, a polyesteramide, a Polyetheramid, a Polyetheresteramid, a cellulose ether, a Celluloseetherester, a starch derivative or Copolymer or a mixture from the several mentioned is.

The dazzling partners can up to a content of 99 Gew. - %. preferably up to 70 Gew. - %, related to the total amount of the moulding composition, used become.

Subject-matter of the invention is further a method to the preparation of the moulding compositions according to invention, characterised in that the individual components and if necessary other additions (conventional additives) in known manner mixed and with elevated temperatures, by 150 to 300 C in conventional aggregates such as interior kneading machines, extruders and double wave snails being preferably schmelzcompoundiert and be fusionextruded. Subject-matter of the invention is further a method to the preparation of the form measured according to claim 1 to 15, whereby that biological degradable polymers with a concentrate from biological degradable polymer and at least a stabiliser A) or a2) as well as component B) and additives mixed and with elevated temperature to be schmelzcompoundiert if necessary and fusionextruded.

As extruders for example used can become: a complete interdigitated, dense twin screw extruder, an a screw-type extruding machine for the high speed extruding, which after the principle stator/rotor (z. B. Staromix of the companies Mature houses), a three-snail ex works more truder, a continuous/discontinuous working KO-kneader, a continuous dispersion kneading machine with slow current rotor stator combination (z. B. KEX, company Drais, Mannheim).

Subject-matter of the invention is furthermore the use of the moulding compositions according to invention to the preparation of semi-finished material, films, in particular hygiene foils, garbage bags, roof bottom clamping courses and films as ingredient of garment, injection mold parts, in particular planting pots, planting chambers, planting binder, multifilaments, monofell, fibers, in particular cut fibers, fibers for the coating of heat-sealing-capable filter papers, fleeces and fabrics, in particular Geotexti lien, protective clothes, automobile inside paneling as well as the articles themselves.

Examples example 1 on a two-wave extrusion of the type ZSK of the company Werner & Pfleiderer, Stuttgart, with a L/D ratio of > 35 and particular kneading elements, with at least the first cooled feeding zone polyesteramide (z becomes. B. BAK&commat; 1095 the Bayer AG) with an aromatic polycarbodiimide (z. B. Stabaxol# P 100 the Rhine chemistry Rheinau GmbH) with 170 C to 190 C melted. In such a way extruded strands become dried in a water bath cooled, granulated and.

BAK# 1095 is copolykondensiert a polyesteramide from adipic acid, butanediol and caprolactam with an ester/amide weight ratio of 70/30, random with a relative solution viscosity of 2,78 measured at 1 thread. % igen solution in meta cresol with 20 C.

BAKO 2195 is a polyesteramide from 32, 3 Gew. - % adipic acid, 11.7 Gew. - % 1.4 butanediols, 15.0 Gew. - % diethylene glycol, 41 Gew. - % adipic diamine, random copolykondensiert, with a relative solution viscosity of 2,8, measured at an l gew. - % igen solution in m-cresol with 20 C.

#### Tabelle1

Concentrates with hydrolysis protective agent (number data of the composition Gew draw. - %)

EMI18.1

<tb> Concentrate <September> A <SEPTEMBER> B <SEPTEMBER> C <SEPTEMBER> D <SEPTEMBER> E

<tb> 9090BAK# 1095 <September>

<tb> 909090BAK# 2195 <September>

<tb> 1010Stabazol# P <September>

<tb> Stabaxol&commat; P10010 <September> 10

<tb> 10Stabazol# P200 <September>

<tb> rel. <September> Solution viscosity <September> 2.78 <September> 3.27 <September> 2.66

<tb> Example 2 BAK# 2195 becomes injection molded as merging with a concentrate prepared after example 1 probes (80\* 10\* 4 mm).

The staffs become with 60 C in water stored, that the sterility attitude with 0,02 Gew. - Becomes % sodium azide as biocide staggered. The results are in table 2 shown.

Table 2: Results of the storage in water with 60 C

EMI19.1

<tb> Lagerzeit/d <September> BAK <SEPTEMBER> 2195 <September> BAK <SEPTEMBER> 2195 <September> + <September> BAK <SEPTEMBER> 2195 <September> + <September> BAK <SEPTEMBER> 2195 <September> + <September> BAK <SEPTEMBER> 2195 <September> +

<tb> <September> wild <September> 10% <September> Konzen 10% <September> Konzen 10% <September> Konzen

<tb> <September> September <stepped> B <SEPTEMBER> from <September> Joined <September> D <SEPTEMBER> from

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